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Attorney Docket No.: 27057U

Date: ____ July 2006

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

GÖBBERT

Art Unit: 1765

Examiner: Unknown

Application No.: 10/553,910

Filed: 24 January 2006

Title: **METHOD FOR PRODUCING A COMPOSITE MATERIAL THAT CAN BE
USED AS A PHOTONIC CRYSTAL**

TRANSMITTAL LETTER

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

Submitted herewith for filing in the U.S. Patent and Trademark Office is the following:

- 1) Submission of Documents to Supplement Filing Documents under 35 USC 371;
- 2) English Translation of PCT/IB/373 (International Preliminary Report on Patentability).

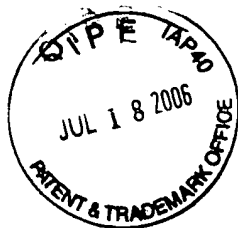
The Commissioner is hereby authorized to charge any deficiency or credit any excess to Deposit Account Number 14-0112.

Respectfully submitted,
NATH & ASSOCIATES PLLC

By:

Gary M. Nath
Reg. No. 126,965
Gregory B. Kang
Reg. No. 45,273
Customer No. 20529

GBK/le



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SUBMISSION OF DOCUMENTS
TO SUPPLEMENT FILING DOCUMENTS UNDER 35 USC 371

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

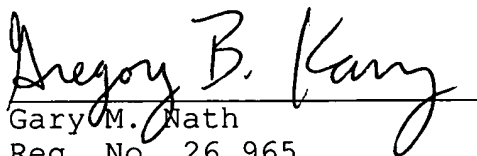
In order to supplement the filing documents for the national phase filing Under USC 371 commenced on **21 OCTOBER 2005**, applicant now submits the following documents:

- 1) English Translation of PCT/IB/373 (International Preliminary Report on Patentability).

Please charge any deficiency or credit any overpayment to our Deposit Account Number 14-0112.

Respectfully submitted,
NATH & ASSOCIATES PLLC

By:



Gary M. Nath
Reg. No. 26,965
Gregory B. Kang
Reg. No. 45,273
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference P 43 908 WO	FOR FURTHER ACTION	See item 4 below
International application No. PCT/EP2004/004295	International filing date (<i>day/month/year</i>) 23 April 2004 (23.04.2004)	Priority date (<i>day/month/year</i>) 23 April 2003 (23.04.2003)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant ITN NANOVAION GMBH		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input checked="" type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Date of issuance of this report 02 March 2006 (02.03.2006)
Facsimile No. +41 22 740 14 35	Authorized officer <div style="text-align: center; font-weight: bold;">Yolaine Cussac</div> Telephone No. +41 22 338 70 80

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

Translation

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing
(day/month/year)

Applicant's or agent's file reference

P 43 908 WO

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/EP2004/004295

International filing date (day/month/year)

23.04.2004

Priority date (day/month/year)

23.04.2003

International Patent Classification (IPC) or both national classification and IPC

Applicant

ITN NANOVAION GMBH

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/EP

Authorized officer

Facsimile No.

Telephone No.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2004/004295

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language
_____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2004/004295

Box No. II

Priority

1. ☒ The following document has not yet been furnished:

☒ copy of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(a)).

☐ translation of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date in the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2004/004295

Box No. V	Reasoned statement under Rule 43bis 1(a)(i) with regard to novelty, inventive step or industrial applicability: citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	4-18, 20, 28, 29	YES
	Claims	1-3, 19, 21-27, 30, 31	NO
Inventive step (IS)	Claims	4-18, 20, 28, 29	YES
	Claims	1-3, 19, 21-27, 30, 31	NO
Industrial applicability (IA)	Claims	1-31	YES
	Claims		NO
2. Citations and explanations:			
1. Reference is made to the following documents:			
D1: M. Lanata et al., Optical Materials 17,11 (2001)			
D2: H. Miguez et al., Advanced Materials 13, 1634 (2001)			
D3: US 2002/074537 A1			
D4 D. Wang et al., Advanced Materials 14, 908 (2002)			
D5: Y. Hongwei et al., Advanced Materials 11, 1003 (1999)			
2. The present application does not meet the requirements of PCT Article 33(1), because the subject matter of claims 1-3, 19, 21-27, 30 and 31 is not novel within the meaning of PCT Article 33(2) for the following reasons:			
2.1 Document D1 discloses, in the abstract, a photonic crystal, which is an inverse opal of titanium dioxide with a refractive index of over 2.5, which has been produced with the aid of a template of polystyrene beads. The photonic crystal therefore comprises two materials, namely a three-dimensional periodic sequence of air			

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2004/004295

Box No. V

Reasoned statement under Rule 43bis1(a)(i) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

bubbles which are enclosed by a sheath of titanium dioxide.

The subject matter of claims 1-3, 19, 22-25, 30 and 31 is not therefore novel with respect to D1.

2.2 Document D2 discloses inverse opals formed by silicon with a refractive index of 11.9 and from germanium with a refractive index of 16, which are suitable for the production of photonic crystals based on the composite materials with liquid crystals (cf. page 1634, left-hand column, line 26 to right-hand column, line 5).

The subject matter of claims 1-3, 19, 22-25, 30 and 31 is therefore not novel with respect to D2.

2.3 Document D3 discloses photonic crystals made from inverse opals made from silicon with a refractive index of 3.45 which are infiltrated with liquid crystals (refractive index $n_a = 1.6$ and $n_b = 1.4$) (cf. claims 38, 40, 42 and 55 as well as paragraphs [0018], [0038] and [0039]).

The subject matter of claims 1-3, 19, 22-25, 30 and 31 is therefore not novel with respect to D3.

2.4 Document D4 discloses inverse opals for photonic crystals which are made from nanoparticles with a core of gold and a shell of silicon dioxide (cf. page 908, right-hand column, page 912, left-hand column, Fig. 1 and diagram 1).

The subject matter of claims 1-3, 19, 21-25, 27, 30 and 31 is not therefore novel with respect to D4.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2004/004295

Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

2.5 Document D5 discloses photonic crystals (cf. page 1004, left-hand column, lines 21-25), which are produced by infiltrating a template of polystyrene beads with a diameter of 420 nm with a nickel oxide precursor. After removal of the polystyrene beads and partial reduction, inverse opals which contain nickel oxide and the nickel are obtained (cf. page 1006, left-hand column, and the figures). The subject matter of claims 1-3, 19, 21-27, 30 and 31 is not therefore novel with respect to D5.

2.6 The subject matter of claim 4 is novel with respect to the prior art, since none of the documents cited involves infiltration of a secondary template with subsequent removal of the secondary template.

2.7 The subject matter of claims 5-18 is likewise novel, since these claims are dependent on claim 4.

2.8 The subject matter of the dependent claims 20, 28 and 29 is also not disclosed in the known prior art.

3. The subject matter of the dependent claims 4-18, 20, 28 and 29 involves an inventive step within the meaning of PCT Article 33(3), since the configurations of the invention disclosed therein are in no way rendered obvious by the known prior art.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2004/004295

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

With regard to PCT Article 6, it should be noted that there does not appear to be any difference between the subject matter of claims 22, 23 and 24.